XXVI. *Remarks relative to the affinities and analogies of natural objects, more particularly of* Hypocephalus, *a Genus of* Coleoptera. *By* JOHN CURTIS, *Esq., F.L.S. &c. &c.*

Read April 4, 1854.

THE number of extraordinary new forms, which have been discovered of late years, has led to a great deal of speculation regarding their position in the scale of nature. This has been exceedingly useful and instructive, although often very perplexing, and I fear that we not unfrequently take the shadow for the substance, mistaking analogies for affinities. The curious, indeed wonderful insect, which Mr. White exhibited and commented upon at a recent meeting of the Linnean Society, will be my apology for offering any remarks upon the subject.

The affinities of natural objects have been supposed to form a chain, a net, or a series of circles, the last composed of certain definite numbers of types, &c. These ingenious systems have been ably discussed by talented men*, but they have not made a lasting impression, owing probably to the multitude of exceptions that occurred and the gratuitous assumptions necessary to fill up the vacuum occasioned by absent members. We all know that "the Natural System" has been long an object of pursuit, which I expect we shall never overtake. The truth appears to be, that there is no perfect natural system, according to our limited notions; and it will be a stumbling-block to those who think otherwise, to find that where a few links are forthcoming, which unite certain groups, there are a vast number more discovered, which disturb what promised to be with fewer materials a complete arrangement. Thus we have lines broken, circles not meeting, most curious types presenting themselves to augment infallible numbers, and to be dismissed by the theorist as inconvenient intruders. No doubt there is a plan in Creation which is not revealed to us; but to study, write upon, and understand a subject, we must form a system (imperfect though it be), in order to methodise and arrange our materials as they are collected; and to accomplish this, we must be contented with chains which are continuous, of unequal lengths, either running entirely parallel, or converging, or diverging, but forming Stirpes or Families which harmonise, are easily comprehended, and exhibit various lines of relationship or resemblance.

In searching for a natural system, we seek for perfect unity or harmony, which being frequently interrupted, we fail in our object, and are disappointed. No doubt harmony, having a divine origin, pervades all creation; but it is manifest that there are also disturbing forces which interfere with that first principle. Even amongst the heavenly bodies, comets in their eccentric course seem to us destined to effect changes in that otherwise perfect harmony. In this Planet which we inhabit, we have abundant evidence, probably

* Vide the Essays of MacLeay, Horsfield, Vigors, Swainson and Newman.

of their agency, but at all events of disturbing forces, which have apparently succeeded one another from the beginning of the world, and are active still. We ought not therefore to be more surprised at finding systems not to be perfect, than we are to find that sound is not free from discord, nor form from distortion.

Perfection seems to be equivalent to harmony; and this as regards form, which most concerns us at present, was best understood by the Greeks. It consists of a combination of parts, whose relative proportions are so perfectly in harmony in every respect, that the object becomes pleasing to the eye, even when uncultivated; it leads the mind to the contemplation of a type of grace and beauty exceeding our daily experience, and thus the Grecian sculpture has become the standard of taste. The human heart is greatly affected by harmony: Poetry, Music and Painting bear ample testimony to its influence. Order and arrangement are component parts of harmony, for without them no system could exist.

A knowledge therefore of the component members of bodies and the harmonious combination of them is, or ought to be, the basis of all arrangements, and the closer we keep this in view the more true to nature, and the more satisfactory will the system be, because it will make everything subservient to true affinities. But in our progress to establish a system we are sure to find disturbing forces, producing aberrant types of form, which like discordant notes in music, will not chime in anywhere; they are too flat for some chords, too sharp for others, and are thought to be anything but consistent with our notions of what is natural. Now to this description of animals belongs the anomalous beetle which Mr. White introduced to us, and which he has been so obliging as to allow me to examine at my leisure. It has received the name of *Hypocephalus*, and resembles so many individual members of different families, yet agreeing with none, that it has from its first discovery been a subject of speculation, in which M. Desmarest, Dr. Gistl, Dr. Burmeister, M. Guérin-Méneville and Mr. Westwood have taken part.

I should say, it has the head of a Tortoise, the tusks of a Walrus, the legs of a Kangaroo, and certainly the strength of a giant; probably a hundred times greater in proportion to its size than that of an Elephant. Amongst Insects it has been likened to the Mole-cricket, and so deceptive are analogies, that when I first beheld the *Hypocephalus* at Florence, I thought it was a gigantic *Brenthus**. M. Desmarest considered it allied to the *Silphidæ* or Grave-digging beetles, and Dr. Burmeister and Mr. Westwood are agreed that it is allied to the *Cerambycidæ*. Were it not for the deficiency in the number of the palpi, there would be no difficulty in associating it with the *Scaritidæ*: the head and legs being very like those of *Pasimachus*, and the antennæ being nearly those of *Psammophilus*; whilst the robust legs, large head, ample postpectus and remote hind legs of *Caladroum* (a New Holland *Carabus*) at once exhibit a great resemblance†.

It is evident, in making any attempt to associate an aberrant form with a natural family, that great caution is necessary, not to be influenced by analogy, beyond what it is worth,

* It is remarkable that some of the *Brenthidæ* have the hinder angles of the head produced in the male, as in *Arrhenodes*, where they form lobes, smaller in proportion, but of the same character as those exhibited in *Hypocephalus*, which would altogether indicate a similarity of economy.

† Vide also *Clivina*, and *Broscus*; and *Promecoderus* has quite the form of a pigmy *Hypocephalus*.

for a single proof of affinity must be preferred before an assemblage of analogies. This leads me to question the views of my friend Professor Burmeister, regarding the relationship of *Hypocephalus* with the *Prionidæ*, for after a careful investigation I am constrained to believe, that the former genus is more related to the *Lamellicornes*, and for the following reasons, which I will give in a tabular form, the better to contrast the claims of *Hypocephalus* to be associated with either of those Families.

The Lamellicornes	The Longicornes
are Pentamerous.	are Tetramerous.
Mouth with 4 Palpi, quadri- and tri-articulate. Mandibles often corneous.	Mouth with 4 Palpi, quadri- and tri-articulate. Mandibles always corneous.
Antennæ short, capitate, or clavate, often with many moniliform joints.	Antennæ elongated, not moniliform.
Eyes small, round or oval.	Eyes emarginate.
Elytra horny or coriaceous.	Elytra horny or coriaceous.
Legs, hinder not unfrequently incrassated.	Legs, hinder not incrassated.
Tibiæ thick, dilated, 4 anterior emarginate externally, forming teeth or lobes; apex with minute spurs.	Tibiæ dilated, generally compressed, not emarginate externally.
Tarsi simple; anterior short and a little dilated. All five-jointed.	Tarsi, penultimate joint generally bilobed, sometimes with a head, or false joint at the base of the terminal one. All four-jointed.

After this simple comparison, let us take a more general view of the character. In no family of beetles is the thorax so fully developed as in the *Scarabæidæ*, and the legs are almost universally robust. In *Melolonthidæ*, as indeed in all the *Lamellicornes*, the tibiæ are more or less lobed or toothed outside*. In *Chrysophora* and *Pelidnota*, in *Ripsinus*, *Dichelus* and *Pachycnema* we find the hinder legs very much larger than the other four; the thighs are very much incrassated, the tibiæ often curved and toothed, whilst the genus *Hexodon* proves what extraordinary departures there are from the typical forms. When we arrive at the *Lucanidæ* we find a description of mandibles that singularly accords with *Hypocephalus*, especially in *Pholidotus* and *Orthognathus*, whilst the eyes are small, remote, and placed behind the antennæ. The labrum and labium are generally invisible after death, and the maxillary lobes are very small, whilst the palpi are well developed, as in *Platycerus*, the typical *Lucanidæ*, &c.

Let us now turn to the apparent likeness between *Hypocephalus* and the *Longicorns*. In approaching that Family we find *Passandra*, which bears some resemblance to *Hypocephalus* in the form of the head and antennæ, and in the position of the eyes, but the legs are remarkably small; *Passandra* however is considered to form one of the links to *Parandra* (which may be termed a tetramerous *Lucanus*), and making an approach to *Hypocephalus*, but the characters of the mouth, eyes, and tarsi, will not support any claims to affinity†. Next comes *Spondylis*, which in the form of the antennæ and the proportions of the palpi, agrees with *Hypocephalus*, but the mentum is not trilobed, the

* Vide *Copris*, Curt. Brit. Ent. pl. 414; *Geotrupes*, pl. 266, *Aphodius*, pl. 27, also *Melolontha*, *Cetonia*, and *Lucanus*.

† I may add that I consider *Trictenotoma* a Heteromerous Lucaniform beetle, not a Longicorn.

eyes are dissimilar, the tarsi tetramerous* and of a different character, being all equally long and dilated. Another genus, *Cyrtognathus*†, is apt to confound our notions of analogy and affinity, but in truth it bears only a resemblance to *Hypocephalus*, principally owing to the elongated head, and the mandibles being bent down like a beak, with lateral protuberances, and well-developed palpi‡. For the eyes are very large, and reniform, being deeply emarginate, approximating, indeed almost meeting on the crown: the head is not dilated at the base, having no angles, far less any lobes: the antennæ are very long and curling, more than half the length of the insect, and 12-jointed, the joints compressed, completely serrated, the third joint very long: the thorax is broader than long, the sides angulated, with a large conical porrected spine at the base of the antepectus, between the anterior coxæ; the postpectus not unusually large; the coxæ approximating in pairs: the scutellum typical and triangular. Elytra more than twice, in some specimens nearly thrice, as long as the head and thorax united. Wings ample. Abdomen as large as the postpectus. Legs very long, stoutish, compressed: thighs stout, but not incrassated: tibiæ long, especially the hinder, straight, not dilated nor lobed, but the first pair are spiny; all with a pair of acute spurs at the apex, *longest* in the *hinder* pair: tarsi tetramerous, nearly of equal length, the two anterior pair depressed, dilated, and very pilose beneath, 3rd joint bilobed, terminal joint long and elavate, with a minute spurious joint forming the base; the joints in the *hinder* pair with their angles spiny, and two series of hair beneath: claws long, curved and sharp. It is an inhabitant of Mongolia, considerably to the north of the Equator.

It would be unreasonable to deny that there is a very considerable analogy existing between *Hypocephalus* and *Cyrtognathus*, but if we look to the antennæ having 12, instead of 11, joints, to their great length and relative proportions, as well as to the situation, magnitude, and form of the eyes, the size and figure of the thorax, the scutel, sternum and elytra; having wings for flight; to the long sprawling legs, neither robust nor truly 5-jointed, to the long simple tibiæ, the dilated and bilobed and spongiose tarsi, it is impossible to allow that there is any affinity. *Cyrtognathus* is a *Longicorn*, *Hypocephalus* is not§.

I must no longer defer giving an ample, and I trust faithful, description of

Hypocephalus, Desmarest‖. Tab. XXV. fig. 1.

Head elongated (f. 2 & 3), with 2 large vertical conical lobes on each side of the mandibles (*l*), the crown flattened and terminating abruptly at the base, which is dilated, the angles very much elongated and

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* The minute joint at the base of the terminal joint, if accepted, renders it pseudo-pentamerous.

† Zool. Journ. vol. ii. pl. 19. f. 4. *Dorysthenes rostratus*, Vig.

‡ I am under the necessity of regretting my inability to compare the trophi satisfactorily for want of specimens to dissect, which prevents me from doing full justice to the subject. I can however see enough to convince me that the labrum, mentum, and proportions of the palpi are very different in those two genera.

§ As *Cyrtognathus* was the insect exhibited by Mr. White to confirm the supposed affinity of *Hypocephalus* with the *Cerambycidæ*, it was necessary to enter fully upon the investigation of that insect. Since this paper was read he has adduced another insect, named *Baladeva Walkeri*, in support of his views.

‖ Guér. Mag. Zool. Class IX. pl. 24, and Westw. Arcana Entomologica, vol. i. p. 35, pl. 10 and p. 111.

forming slender subclavate lobes. Eyes placed behind the antennæ, lateral, oval, oblique, protected in repose by the projecting margin of the crown, moderately convex, and finely granulated. Antennæ (f. 4 & 1 *a*) remote from the base, inserted behind, and at the base of, the anterior lobes of the head, glossy, depressed beyond the middle, sparingly clothed with depressed hairs on all sides, much shorter than the head, 11-jointed, basal joint oval, the longest and stoutest, 2nd the smallest, cup-shaped, 3rd obovate, truncate, longer than the following, which are cup-shaped, distinctly articulated, almost imperceptibly increasing in diameter to the middle, being slightly produced on the inside and diminishing to the extremity, apical joint somewhat obcordate. Underside of head (f. 1) exceedingly polished, the sides punctured, rugose, the lines from the hinder lobes emarginate, leaving a large triangular space, when the head is porrected (*s*), membranous in the centre and striated transversely, with a circular cavity before the middle, the sides irregularly striated, pubescent at the base. Eyes not visible from beneath†. Labrum invisible ("petit, triangulaire," *Desm.*). Mandibles strong (*m*), porrected, slightly drooping, parallel, conical yet flattened, with a large tooth on the outer margin. Maxillæ invisible: Palpi (f. *p*) long and stout, inserted immediately under the mandibles, hairy and rough at the base, attached to 2 minute scapes, 4-jointed, slightly pilose at the extremities, 2 basal joints clavate, elongated, 1st a little the longest and stoutest, 2nd clavate, 3rd obovate truncate, 4th a little the broadest, axe-shaped, being truncated obliquely, the apex spongiose. Mentum (f. 4*) transverse-oval, the margin trilobed, the central lobe trigonate, the lateral lobes pilose. Palpi (*p*) nearly as long as the maxillary and very similar in form, attached to two approximating scapes, triarticulate, basal joint longest and the stoutest, 2nd nearly as long, 3rd axe-shaped, truncated obliquely. Thorax very large, egg-shaped, very convex and smooth, sides margined, anterior margin ciliated, with a deep and broad channel before, formed by the base of the head; hinder margin concave before the pseudo-scutellum which is large, trigonate, very rough, the apex shining and somewhat acuminated, with a slight ridge down the centre. Anterior margin of the antepectus forming a large triangular space (f. 1. *s*), the point terminating in a semicircular cavity, the margins with a row of 6 trigonate blunt teeth on each side, becoming broader as they approach the head, the whole like the molars of an elephant, and ciliated internally with short stiff hairs. The sternum forms a long, linear, deeply channeled lobe, between the coxæ, the apex very dilated, cordate, with a very elevated ridge in the centre, like a nose in profile (*a. p*): postpectus very ample, forming an emarginate lobe between the middle pair of legs; posterior margin very sinuated before the hinder coxæ, the lobe between them tongue-shaped, the margins thickened (fig. *p. p*). Elytra scarcely so large as the thorax, very convex, margined, acuminated, connate, the base depressed and the sides forming slightly raised angulated plates; coriaceous, rugose, with 4 slightly raised thread-like, oblique, longitudinal lobes. Abdomen very small, trigonate-conic, 5-jointed, very smooth, the sides and apex alone edged with pubescence. Legs enormously stout and powerful, especially the hinder pair: coxæ received into large orbicular sockets, globose or conical, trochanters subovate, the hinder forming large conical prominent lobes or spines: Thighs short and stout, anterior the shortest, hinder the largest, scooped out beneath and forming a flattened tooth on the outside, near the middle; apex deeply notched: tibiæ very strong, somewhat flattened and dilated, longer than the thighs; anterior with a large lobe on the outside of the apex and another at the middle, with 2 strong spurs on the inside of the apex: middle pair similar but a little longer, spines the same but smaller, the truncated apex ciliated: hinder pair the longest, less dilated, very much incurved, compressed towards the apex, which forms a claw on the under side, with a small tooth inside; it is truncated obliquely, forming a heel above, and densely clothed with fulvous soft hairs: tarsi 5-jointed, long, slender; anterior the shortest (f. 5), a little dilated, basal joint elongated bell-shaped, 2nd somewhat cup-shaped, 3rd smaller, 4th the smallest, all the angles produced into teeth; underside smooth, excepting 2 lines of hairs on

† In Mr. Westwood's figure they are visible.

the basal joint beneath: middle pair almost as long as the tibiæ, basal joint equal in length to the three following, clavate, 2nd and 3rd somewhat obovate, 4th the smallest, obtrigonate, all truncated, concave beneath, with a spine at each angle, basal joint with 2 series of hairs beneath, 5th joint elongate, clavate, produced into a semicircular horny plate on the underside: hinder pair with the basal joint much shorter than that of the middle pair; claws not large but curved and acute.

Fam. XENOMORPHÆ, Gistl. *Mesoclatus paradoxus*, Gistl.

HYPOCEPHALUS ARMATUS, Desmarest? Pitchy: head and mandibles with scattered punctures: palpi and antennæ castaneous. Thorax black, with faint scattered punctures, stronger round the margins: scutel with the base densely punctured, and opake black, apex punctured but shining, and forming a smooth line to the base. Tibiæ punctured, especially above, the hinder rugose; tarsi castaneous; claws black; apex of coxæ and trochanters inclining to castaneous. Abdomen with an ochreous membranous line at the base of each segment. It is $2\frac{1}{2}$ inches long*; the thorax about 10 lines broad.

There are so many differences between M. Desmarest's figure and Mr. Turner's specimen†, that in all probability they are, if not distinct, the sexes, this being a male I presume. My descriptions and figures may assist in settling this question, and I trust they will prove serviceable in illustrating the history of this anomalous beetle, as well as lead to a careful examination, in living specimens, of the extraordinary apparatus under the head, which may also be a sexual character.

Before further discussing the position of *Hypocephalus* I will attempt to complete its history as far as I am able, but at present I can only conjecture its habits by analogy.

Many specimens of this beetle have been found in the mining districts of Brazil, considerably south of the Equator. Three are reported to have been met with in the carcase of a dead horse, and others creeping upon the ground. It is also stated to live in rotten wood in forests. There is every reason to believe that *Hypocephalus* is a burrowing insect, and probably lives underground. Its attenuated form is admirably adapted to forcing its wedge-shaped head into any crevice, with an incredible power of resistance in the hind legs, and its tapering behind is no less calculated to enable it to retreat, folding its enormous limbs by the sides of its small body. Under such circumstances one would expect to find unusually small antennæ, which readily fall back and beneath the head, for protection. Wings of course are useless, whilst its connate or soldered elytra give additional solidity to the body, and their partial separation allows of an expansion of the abdomen, under great exertion or pressure.

The fore feet, like those of other burrowing insects, are fitted for scraping, clearing away the refuse, and passing it backward. The lobed jaws probably fit into the wonderful apparatus at the base of the head, and together with the protuberances on either side seem to form an instrument for grinding its food, which may then be deposited until required in the pouch, which looks indeed like a ruminating stomach. The mandibles are formed for clawing and pulling, or tearing, and the two rows of teeth, like the molars of an ele-

* Mr. Westwood's specimen is $3\frac{1}{2}$ inches long.

† This example had broken feet, as my figure shows, and probably it was aged, or dead when found; young and perfect specimens may have longer and sharper spines and more hairs upon the limbs.

phant, are evidently for grinding or mastication, the jaws by themselves being useless in that respect, yet I expect they are capable of lateral motion.

Having shown that this pentamerous beetle agrees with the *Lamellicornes* in various ways, whilst it disagrees with the *Longicornes* in many, I will assign my reasons for associating *Hypocephalus* with the former Family, even were the claims balanced, excepting the tarsi.

I confess that I have still so good an opinion of the tarsal system of Geoffroy, and adopted by Latreille, as a basis for the primary divisions of the *Coleoptera*, that I do not hesitate to challenge any systematist to exhibit another, better, more useful, or less objectionable*. It is usual to term this an artificial System, but that which is based upon anatomy is no more artificial in Entomology than in any other Class of animals, and the skeletons of Insects being external, the joints of the legs and feet are as purely anatomical as the bones (the femur, tibiæ, &c.) of any quadruped or bird. In pursuing the tarsal system, no one will attempt to deny meeting with many exceptions to the general type of form, but these occur in the minuter groups, which often seem to become feeble in their development, and depart from the perfection, if I may so term it, exhibited by the large and typical species. In the Family *Staphylinidæ*, for example, the number of joints varies in the feet, but this is confined to the minute species†, and to an amount so small, that it cannot justify our abandoning so valuable and tangible a character for dividing the enormous Order Coleoptera. And when we examine the large and perfectly-developed examples, which must decide the position of a Family, we find the *Staphylinidæ* an undoubted pentamerous group‡; the larvæ also in this instance assimilating so well with those of the *Carabidæ*, that it is at present difficult to decide to which family they belong.

My experience teaches me, that as regards affinities, animals do not descend in their claims of relationship, viz. If the types of a group exhibit certain perfections in their structure, that group has no absolute affinity to a family typically less perfect, and cannot therefore be transferred to that inferior group, without doing a violence to nature's laws. For instance, it would be unnatural to remove a member of the Family *Carabidæ*, with its 6 palpi, to any other less perfect, however modified the tarsi might be, or however strange its contour§. On the same principle, its pentamerous character excludes it from entering the lines of the *Heteromera*, or any other of the great sections.

This is my reason for maintaining that *Hypocephalus* cannot be admitted amongst the *Longicornes*: it must find a place amongst the *Pentamera*. It may be affirmed that the *Tetramera* are pentamerous,—this I cannot admit; the portion considered as a 4th or extra joint, even when articulated, is not the analogue of the 4th joint in the *Pentamera*; it is

* Consult Latreille's Genera Crustaceorum et Insectorum, and that admirable volume, the Considérations Générales.

† Vide Curtis's Brit. Ent. *Homalota*, pl. 514; *Falagria*, pl. 462; *Bledius*, pl. 143.

‡ See the dissections in the Brit. Ent. of *Emus hirtus*, pl. 534, and of 17 other genera of the same family, all of which are pentamerous; and it is deserving of remark, that generally when the number of joints is reduced, they fail in the anterior feet: vide *Phytosus*, pl. 718.

§ Were it not for the number of the palpi, who could imagine that *Mormolyce* and *Omophron* were types of the same family—and that *Carabidæ*?

merely a head or fulcrum at the base of the terminal joint, which is rendered neeessary from the 3rd joint being bilobed and eushioned beneath; but as a general rule I eonsider the bilobed joint to be the penultimate, not the antepenultimate joint, throughout the *Coleoptera*, espeeially where there is only one bilobed joint*; and when a joint is either added or withdrawn, the change takes plaee at the *base* of the tarsus†. The *Heteromera*, I think, substantiate this position, for in the four anterior feet, it is the 4th joint which is bilobed; but in the hinder pair it is the 3rd joint which is thus formed, in those speeies whieh are furnished with bilobed joints. Even in the few exeeptions, if they be admitted as such, we find *more* than one bilobed joint in the foot, or where it is the antepenultimate, which it very rarely is, whieh is altered in strueture, it is not bilobed, but cup-shaped or sloped off obliquely; moreover the false joint in the *Longicornes* is not eushioned beneath like the 3 preeeding joints, whieh shows it is merely the base of the 4th or terminal joint.

Neither do I insist that *Hypocephalus* is a *Lamellicorn*, although I feel a conviction that it is not a *Longicorn*. All my claims for it are based on its being truly a Pentamerous beetle, which draws it nearer to the *Lucanidæ* than it can possibly be attracted to the *Cerambycidæ*, by any less important eharacter. If indeed subsequent diseoveries should furnish types to unite the *Lucanidæ* and the *Prionidæ*, *Hypocephalus* may possibly assist in sueh a union, and I am not sure that it would not be more in accordanee with nature, to ehange the position of the *Heteromera* in a linear arrangement, and attaeh them to the *Trimera*, with whieh they have a considerable resemblanee. For the *Heteromera* whilst partaking the charaeters of numberless families, eannot be associated with any of them.

In changing the position of the primary divisions, we should not abandon the philosophie and admirable systems of Latreille; and if we suffer ourselves to be seduced by analogies to wander from well-established systems, without suffieient reasons, we shall have eventually to retrace our steps to free scienee from the diffieulties and eonfusion in which it has been involved. It is only neeessary to review the *Heteromera*, to see how dangerous it would be to lose sight of the tarsal system, for in that extraordinary Seetion, whieh seems so distinct from the rest of the *Coleoptera*, one finds the types of form of almost every family of beetles, from *Carabus* to *Coccinella*‡; and I am ashamed to confess that when I eollected materials for my "Guide to an Arrangement of British Insects," I was so captivated by analogies, whieh was the prevailing taste of the times,

* Vide Curtis's Brit. Ent. Genus *Drypta*, pl. 454; *Demetrias*, pl. 119; *Melandrya*, pl. 155; *Lagria*, pl. 598. Also all the Genera of *Curculionidæ* and *Cerambycidæ*; the only exceptions are in the *Trimera* and perhaps *Xylophilus*.

† Additional joints seem to be added at the base of the Tarsi in the *Hydrophilidæ*. Vide Curt. Brit. Ent. *Elophorus*, pl. 466; *Enicocerus*, pl. 291; *Ochthebius*, pl. 250, and *Hydrophilus*, pl. 159.

‡ Thus the *Carabidæ* are represented by *Adelium* and *Akis*; *Scarites* by *Scaurus*; *Harpalus* by *Pedinus* and *Pandarus*; *Silpha* by *Asida*; *Peltis* by *Pterohelæus* or *Cilibe*, Latr.; *Trox* by *Bolitophagus*; *Melasis* and *Agrylus* by *Dircæa* and *Serropalpus*; *Telephorus* by *Nothus*; *Cleridæ* by *Lagria*; *Brachycerus* by *Moluris* and *Sepidium*; *Callidium* by *Pytho*; *Timarcha* by *Gnaptor*; *Cassidæ* by *Cossyphus*; *Coccinella* by *Nilio*; *Erotylus* by *Campsia*, &c. It is twenty years since I first stated that the Coleoptera were composed of 4 distinct Types (it ought to have been 5 lines of form. Vide Brit. Ent. fol. 498), one of which was the *Heteromera*, which seems to be a group complete in itself, and although reflecting all the other Families, being anatomically distinct from them all.

that I was led to make some changes which I shall correct on the first opportunity. Indeed if we were to reject the form of the feet in the *Coleoptera*, disregarding the number of the joints, the *Heteromera* might be distributed throughout the entire mass.

I must not, however, be misunderstood regarding the value of the structure of the mouth in the formation of systems, for although it may be subject to great modifications, and depart from the typical forms, like the changes in the tarsi, such anomalies are perhaps confined to the minuter members of a family, and a comparison of the trophi is unquestionably of the greatest importance in arriving at the true affinities of insects. As our materials multiply our knowledge advances, and changes become necessary and unavoidable, but let them be made on substantial grounds, not losing sight of the first principles of true affinity.

I trust that those from whom I differ in opinion will be assured, that it is from no love of opposition that I have ventured upon this difficult subject, but with the sole desire of arriving at the truth, and to assist in fixing our Systems on some firm basis, generally understood, and universally to be adopted, so that we may no longer be tossed to and fro, as we are at present; every new work, unscrupulously changing, sometimes entirely reversing or disregarding, the labours of the most profound and learned men of science, that have adorned the pages of Natural History.

EXPLANATION OF THE PLATE.

Tab. XXV.

Fig. 1. exhibits the under side of *Hypocephalus armatus*, mas? a little larger than Mr. Turner's specimen; *a.* the *antennæ*; *m.* the *mandibles*; *p.* the *palpi*, the central pair being the *labial*, inserted at the margin of the trilobed *mentum*. Between the base of the head and the antepectus is shown the large membranous triangular *cavity*, enclosed on the sides by a series of broad teeth (*s*). At the base are inserted the 1st pair of legs, with short, slightly dilated tarsi; a lobe passing between the coxæ, dilated at the apex, keeled down the middle (*a. p*). The ample postpectus follows (*p. p*), near the base of which the 2nd pair of legs is inserted, with much longer tarsi, and at the hinder margin the 3rd pair of legs, with enormous thighs, curved tibiæ, and perfect specimens exhibit 5-jointed tarsi similar to the 2nd pair, but the basal joint is shorter. Fig. *b*. is the small attenuated abdomen.

Fig. 2. Upper side of head, showing the spreading lobes at the base (*b*); *a.* basal joint of antenna; *l.* lateral lobes of the head; *m.* the mandibles; *e.* the eyes.

Fig. 3. The insect in profile; *a.* the antenna; *l.* lateral lobes of the head; *m.* the mandibles; *p.* the palpi; *e.* the eye; *s.* the serrated or toothed margin of the antepectus.

Fig. 4. Antenna magnified.

Fig. 4*. The trilobed broad mentum; *p.* the triarticulate palpus.

Fig. 5. Four basal joints of the anterior tarsi magnified.

To illustrate this subject as far as I am able, I have added figures of the trophi, &c. of *Cyrtognathus rostratus*, Fabr.

Fig. 6. Upper side of head; *a.* basal joint of antenna; *m.* mandibles; *e.* eyes.

Fig. 7. Upper side of another specimen, with the thorax, base of elytra and scutellum. The eyes more approximating.

Fig. 8. Head and thorax in profile; *a.* the antenna; *m.* the mandibles; *e.* the eye; *t.* the thorax; *s.* the pectoral spine.

Fig. 9. Labrum.

Fig. 10. Mandible.

Fig. 11. Maxilla with internal lobe; *p.* the palpus, long, hatchet-shaped, 2nd joint the longest.

Fig. 12. Mentum; *l.* labium, formed of 2 lanceolate, very spreading and pilose lobes; *p.* palpus, triarticulate, hatchet-shaped, 2nd joint the longest.

Fig. 13. Anterior tarsus, with subtrigonate, sublunate and bilobed joints and a false or minute joint forming the base of the 4th; *t.* apex of tibia, with the spurs.

March 1854, Belitha Villas, Barnsbury Park.